

**CADTH RAPID RESPONSE REPORT:  
SUMMARY WITH CRITICAL APPRAISAL**

# Hand Antisepsis Procedures: A Review of Guidelines

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## Context and Policy Issues

Healthcare associated infections (HAIs) are considered an important public health problem. In a 2012 report by the Public Health Agency of Canada (PHAC), it was estimated that 5% to 10% of patients hospitalized in Canada will develop a HAI.<sup>1</sup> Pathogens (microorganisms) that cause HAIs can be transmitted from other patients, hospital personnel, or the hospital/medical centre environment.<sup>2</sup> Microorganisms can be transmitted to patients via direct or indirect contact, and health care workers are often the conduit for this transmission.<sup>3</sup> These microorganisms can include such pathogens as *Clostridium difficile* and antibiotic-resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA). The hands of a health care worker can become contaminated by any procedures involving contact with patients, including taking a pulse, blood pressure, or body temperature.<sup>2</sup> The health care worker may then have contact with other patients, resulting in cross-transmission or cross-infection from health care worker to patient. The World Health Organization considers hand hygiene – handwashing using soap and water or a disinfectant hand rub – to be an important process in the prevention of pathogen transmission by the contact route.<sup>3</sup>

Proper techniques and products for hand antisepsis are important to remove microorganisms from the hands. Effective hand hygiene techniques include handwashing, hand wipes, and drying methods.<sup>4</sup> Handwashing is an important technique that is used to remove visible soil or organic material to ensure the removal of microorganisms.<sup>4</sup> Drying methods are important, as wet hands provide better conditions for the transmission of microorganisms.<sup>4</sup> Hand wipes may be used to remove visible soil or organic material, especially when designated handwashing sinks are unavailable.<sup>4</sup>

The purpose of this Rapid Response is to review the evidence-based guidelines regarding the optimal techniques and products for hand antisepsis, best practices for hand-drying post hand-washing, and the use of hand wipes in hospital or residential care settings. Recommendations from these guidelines may be useful to implement proper hand hygiene in clinical practice.

## Research Questions

1. What are the evidence-based guidelines regarding optimal techniques and products for hand antisepsis in hospital or residential care settings?
2. What are the evidence-based guidelines regarding best practice for hand-drying post hand-washing in hospital or residential care settings?
3. What are the evidence-based guidelines regarding the use of hand wipes in hospital or residential care settings?

## Key Findings

Three evidence-based guidelines were identified regarding hand antisepsis procedures. All three guidelines provided recommendations regarding optimal techniques and products for hand antisepsis, two guidelines provided recommendations regarding best practice for hand-drying post hand-washing, and one guideline provided recommendations regarding the use of hand wipes. The guidelines had similar recommendations on hand antisepsis including to decontaminate immediately after direct patient care, when hands are visibly soiled, and use of an alcohol-based rub for the decontamination of hands before and after patient contact and clinical care. Two of the guidelines recommended good-quality paper towels should be used to dry the hands thoroughly. One guideline recommended hand wipes impregnated with plain soap, antimicrobials, or alcohol should not be used as an alternative to alcohol-based hand rub or antimicrobial soap for hand antisepsis.

## Methods

### Literature Search Methods

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Filters were applied to limit the retrieval by health technology assessments, systematic reviews, and meta analyses, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2012 and February 8, 2017. Rapid Response reports are organized so that the evidence for each research question is presented separately.

### Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

**Table 1: Selection Criteria**

<b>Population</b>	Patients in hospital or residential care settings
<b>Intervention</b>	Q1: Hand antisepsis Q2: Hand drying techniques (post hand-washing) Q3: Hand wipes (any antiseptic wipe with or without alcohol)
<b>Comparator</b>	No comparator required
<b>Outcomes</b>	Evidence-based guideline recommendations regarding: Q1: The optimal products and techniques (i.e., duration, methods) for hand antisepsis Q2: Best practice for hand-drying post hand-washing Q3: The use of hand wipes
<b>Study Designs</b>	Evidence-based guidelines

## Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2012.

## Critical Appraisal of Individual Studies

The guidelines were assessed with the AGREE II instrument. Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described narratively.

## Summary of Evidence

### Quantity of Research Available

A total of 250 citations were identified in the literature search. Following screening of titles and abstracts, 249 citations were excluded and one potentially relevant report from the electronic search was retrieved for full-text review. Four potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, two publications were excluded for various reasons, while three publications met the inclusion criteria and were included in this report. Appendix 1 describes the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in Appendix 5.

### Summary of Study Characteristics

A tabular description of the included study characteristics is provided in Appendix 2.

### *Study Design*

Three evidence-based guidelines<sup>4-6</sup> were identified that included recommendations regarding hand antisepsis procedures.

One guideline<sup>5</sup> followed a National Institute for Health and Care Excellence (NICE) accredited process for guideline development, using comprehensive a literature search. The evidence quality of included studies was evaluated according to the Scottish Intercollegiate Guideline Network (SIGN), and a strength of recommendation was reported for each statement.

A guideline from NICE<sup>6</sup> was developed in accordance with the NICE guidelines methodology, using a comprehensive literature search. Evidence quality was assessed using Grading of Recommendations Assessment, Development and Evaluation (GRADE), and a strength of recommendation was reported for each statement.

A third guideline, by the Public Health Agency of Canada (PHAC)<sup>4</sup> was also identified. The guideline did not provide a detailed methodology, nor were details of the literature search provided. Evidence quality was graded using PHAC's own grading system, and a strength of recommendation was reported for each statement.

### *Country of Origin*

The included guidelines were from the UK<sup>5,6</sup> and Canada.<sup>4</sup>

### *Intended Users and Target Population*

The three included guidelines focused on health care workers in hospital and acute care settings (Loveday et al.),<sup>5</sup> primary health care and community settings (NICE),<sup>6</sup> and any health care settings (PHAC).<sup>4</sup>

### *Interventions and Comparators*

All three guidelines<sup>4-6</sup> aimed to provide information regarding hand antisepsis. All of the guidelines<sup>4-6</sup> provided recommendations on hand antisepsis techniques, two guidelines<sup>5,6</sup> provided recommendations on best practice for hand drying, and one guideline<sup>4</sup> provided recommendations of the use of hand wipes.

### *Outcomes*

The guidelines provided evidence-based recommendations for techniques and products for hand antisepsis,<sup>4-6</sup> best practice for hand-drying,<sup>5,6</sup> and the use of hand wipes.<sup>4</sup> The outcomes considered by the guidelines were focused on preventing and controlling healthcare associated infections.<sup>4-6</sup>

## **Summary of Critical Appraisal**

A tabular description of the critical appraisal is provided in Appendix 3.

The guidance by Loveday et al.<sup>5</sup> followed a rigorous methodology by NICE. It included a systematic literature search, clearly described scope and purpose, key recommendations, and editorial independence. The guidance clearly describes selection criteria and evidence is linked to the recommendations. There are few limitations to this guideline. It is unclear if views and preferences of the target population were sought, a procedure for updating the guideline was not provided, there are no tools or advice provided for implementation, and no monitoring or auditing criteria are provided.

The NICE guidance<sup>6</sup> followed rigorous methodology, including a systematic literature search, and clear descriptions of scope and purpose, key recommendations, and editorial independence. The guidance clearly describes selection criteria and evidence is linked to the recommendations. The only limitation identified was a lack of auditing criteria provided in the guideline.

The guidance by PHAC<sup>4</sup> is clearly presented in the areas of scope and purpose, key recommendations, and editorial independence and there are explicit links between the evidence and recommendations. It is unclear if systematic methods were used to search for evidence, criteria for selecting the evidence were not described, the views and preferences of the target population (patients and public) were not sought, there is no procedure provided for updating the guidelines, and there are no tools or advice provided for implementing recommendations.

## **Summary of Findings**

The main findings and guideline recommendations are provided in tabular format in Appendix 4.

*What are the evidence-based guidelines regarding optimal techniques and products for hand antisepsis in hospital or residential care settings?*

All three guidelines<sup>4-6</sup> provided recommendations regarding optimal techniques and products for hand antisepsis in hospital or residential care settings.

All three guidelines<sup>4-6</sup> recommended that hands must be decontaminated immediately before each episode of direct patient contact or care and after each episode of direct patient contact or care, after removing gloves, and any contact with fluids, objects, or equipment that are at risk of becoming contaminated based on moderate<sup>4,5</sup> to high-quality<sup>4</sup> evidence. They also recommended an alcohol-based hand rub for the decontamination of hands before and after patient contact and clinical care, unless hands are visible soiled or contaminated with body fluids or if the patient is excreting bodily fluids in which case soap and water must be used based on high-quality evidence.<sup>4,5</sup> An alcohol-based hand rub solution was recommended to come into contact with all surfaces of the hand and hands were recommended to be rubbed together vigorously until the solution has evaporated and the hands are dry based on high-quality evidence.<sup>4,5</sup>

One guideline<sup>6</sup> recommended that an effective handwashing technique involves three stages: preparation, washing and rinsing, and drying. According to the guideline,<sup>6</sup> preparation requires wetting hands under running water before applying the hand solution. They also stated that the handwash solution must come into contact with all surface of the hand and the hands must be rubbed together vigorously for a minimum of 10-15 seconds before drying with paper towels. These recommendations were based on a previous version of the guideline, which has since been withdrawn; therefore, the level of evidence the original recommendation was based on was unclear.

One guideline<sup>4</sup> recommended that hand hygiene using soap and water should be used to remove visible soil and/or organic material, when a buildup of alcohol-based hand rub feels uncomfortable after multiple applications, after point-of-care with an infectious patient, during outbreaks, or immediately after using toilet facilities. It also recommended that alcohol-based hand rubs with alcohol concentration should be between 60-90% depending on the use and status of the clinical care unit. These recommendations are based on moderate to high-quality evidence.

*What are the evidence-based guidelines regarding best practice for hand-drying post hand-washing in hospital or residential care settings?*

Two guidelines<sup>5,6</sup> provided recommendations regarding best practice for hand-drying post hand-washing in hospital or residential care settings. Both guidelines<sup>5,6</sup> recommended that good-quality paper towels (paper towel quality was not defined) should be used to dry the hands thoroughly. This recommendation is based on low-quality evidence.<sup>5</sup>

*What is the evidence-based guidelines regarding the use of hand wipes in hospital or residential care settings?*

One guideline<sup>4</sup> recommended hand wipes impregnated with plain soap, antimicrobials, or alcohol should not be used as an alternative to alcohol-based hand rub or antimicrobial soap for hand antisepsis. The guideline stated that hand wipes may be used as an alternative to soap and water when hands are visibly soiled and a handwashing sink is not immediately available or when a handwashing sink is unsuitable. This recommendation is based on high-quality evidence.

## Limitations

Three evidence-based guidelines were identified.<sup>4-6</sup> One of the guidelines<sup>5</sup> provided some recommendations based on low quality research studies and/or expert opinion. One of the guidelines<sup>6</sup> used recommendations based on a previous version of the guideline which has since been withdrawn. We were unable to determine the level of evidence the original recommendations were based on. One of the guidelines<sup>4</sup> included manufacturer's recommendations, which were not graded or critically appraised. The same guideline<sup>4</sup> did not provide explicit details on a literature search strategy and methodology. Two of the guidelines<sup>5,6</sup> were produced in the UK, making them less likely to be applicable to the Canadian context.

## Conclusions and Implications for Decision or Policy Making

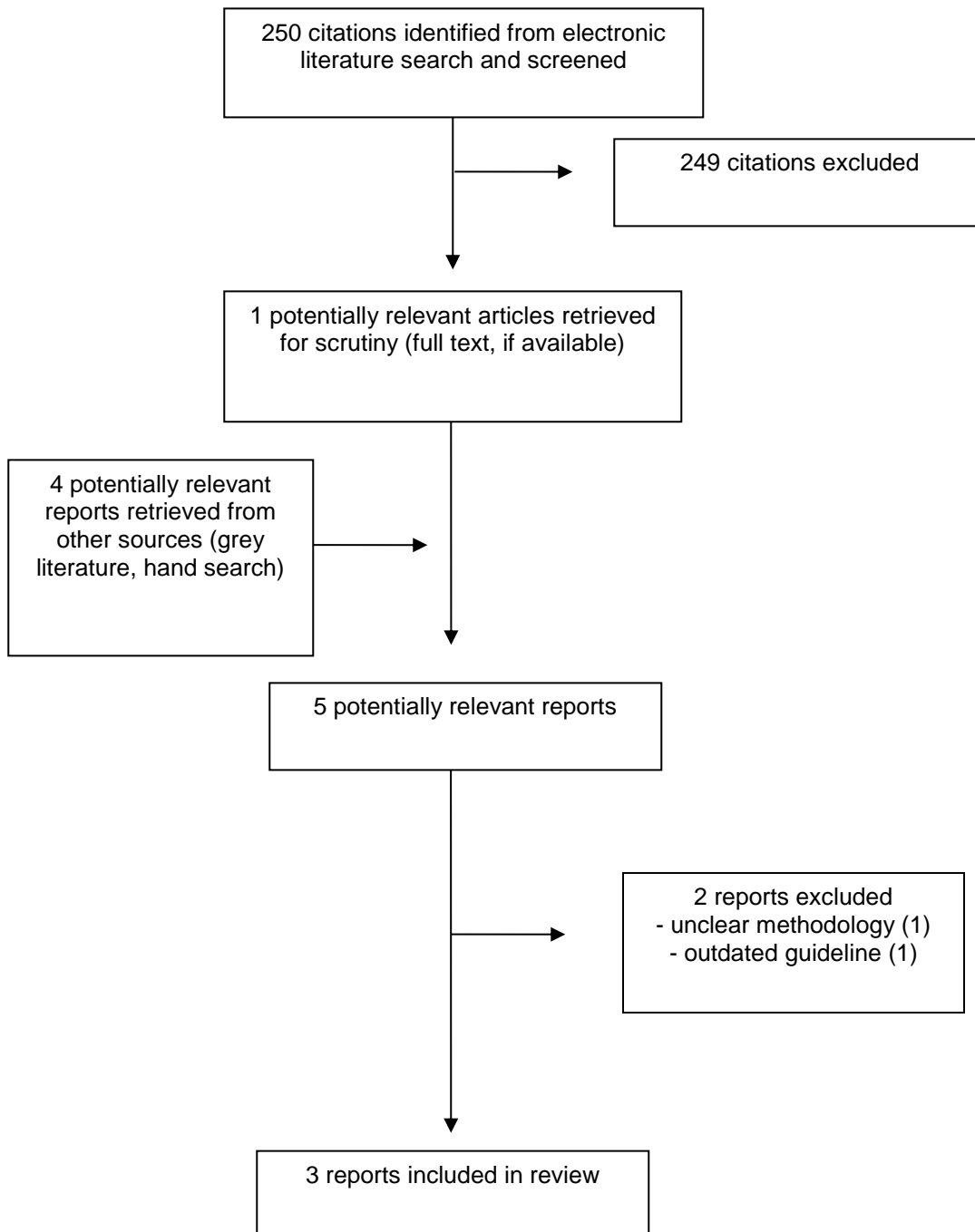
Three evidence-based guidelines<sup>4-6</sup> provided recommendations regarding hand antisepsis procedures. The guidelines had comparable recommendations with varying quality of evidence – low to high quality. One guideline<sup>6</sup> did not provide the level of evidence their recommendations were based on and another guideline<sup>5</sup> provided some recommendations with low quality evidence. Hence, caution should be used when applying these recommendations to clinical practice. One of the guidelines<sup>4</sup> provided recommendations based on moderate to high quality evidence on hand hygiene. All of the guidelines provided comprehensive recommendations regarding proper hand antisepsis procedures, two of the guidelines provided recommendations on hand-drying techniques, and one guideline provided recommendations regarding the use of hand wipes.



## References

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## Appendix 1: Selection of Included Studies



# Appendix 2: Characteristics of Included Publications

**Table 2: Characteristics of Included Guidelines**

Objectives		Methodology			
Intended users/ Target population	Intervention of Interest	Evidence collection, Selection and Synthesis	Evidence Quality and Strength	Recommendations development and Evaluation	Guideline Validation
Loveday, 2014 <sup>b</sup>					
Hospital managers, members of hospital infection prevention and control teams, and individual healthcare practitioners	Hand antisepsis techniques and products; hand drying techniques	Followed a NICE-accredited process for guideline development.  Comprehensive literature search based on consultation with scientific advisors and a guideline development advisory group; selection of evidence relevant to each research question.	Evidence quality assessed according to the Scottish Intercollegiate Guideline Network (SIGN) for study quality assessment.  A strength of recommendation was reported for each statement.	Recommendations developed by a team of specialist infection prevention and control researchers and clinical specialists and a Guideline Development Advisory Group (comprising lay members and specialist clinical practitioners).	Reviewed by key stakeholders, including Royal Colleges, professional societies and organizations, patients, and trade unions.
National Institute for Health and Care Excellence (NICE), 2012 <sup>6</sup>					
The UK's National Health Service and people providing health care in other settings	Hand antisepsis techniques and products	Developed in accordance with the methods outlined in the NICE Guidelines Manual 2009.  Comprehensive literature search, selection, and synthesis involving scientific advisors, a guideline development advisory group, and expert lay persons	Evidence quality assessed using GRADE (Grading of Recommendations Assessment, Development and Evaluation).  A strength of recommendation was reported for each statement.	Recommendations developed by an independent advisory group comprising practitioners (both specialists in the topic and generalists), service or care providers or commissioners, and others working in the area covered by the guideline, plus at least 2 lay members (people using services, their family members or carers, or members of the public and	Reviewed by key stakeholders, including national organizations, local Healthwatch organizations; public sector providers and commissioners of care or services; private, voluntary sector and other independent providers of care or services; companies that manufacture drugs, devices,

**Table 2: Characteristics of Included Guidelines**

Objectives		Methodology			
Intended users/ Target population	Intervention of Interest	Evidence collection, Selection and Synthesis	Evidence Quality and Strength	Recommendations development and Evaluation	Guideline Validation
				community or voluntary sector with relevant experience).	equipment or adaptations, and commercial industries relevant to public health; government departments and national statutory agencies.
Public Health Agency of Canada (PHAC), 2012 <sup>4</sup>					
Infection prevention and control professionals, health care organizations and health care providers	Hand antisepsis techniques and products; hand wipes	Detailed methodology is not provided, nor are details of the literature search provided. Synthesis was performed by a steering committee	Evidence was graded based on PHAC's own grading system.  A strength of recommendation was reported for each statement.	Guideline working group comprising a team of specialist infection prevention and control and health care professionals.	Reviewed by external stakeholders, including health care professional groups.

# Appendix 3: Critical Appraisal of Included Publications

**Table 3: Summary of Guideline Recommendations**

AMSTAR Item	Loveday, 2014 <sup>5</sup>	NICE, 2012 <sup>6</sup>	PHAC, 2012 <sup>4</sup>
<b>Scope and Purpose</b>			
The overall objective(s) of the guideline is (are) specifically described.	√	√	√
The health question(s) covered by the guideline is (are) specifically described.	√	√	√
The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	√	√	√
<b>Stakeholder Involvement</b>			
The guideline development group includes individuals from all the relevant professional groups.	√	√	√
The views and preferences of the target population (patients, public, etc.) have been sought.	?	√	X
The target users of the guideline are clearly defined.	√	√	√
<b>Rigour of Development</b>			
Systematic methods were used to search for evidence.	√	√	?
The criteria for selecting the evidence are clearly described.	√	√	X
The strengths and limitations of the body of evidence are clearly described.	√	√	√
The methods for formulating the recommendations are clearly described.	√	√	√
The health benefits, side effects, and risks have been considered in formulating the recommendations.	√	√	√
There is an explicit link between the recommendations and the supporting evidence.	√	√	√
The guideline has been externally reviewed by experts prior to its publication.	√	√	√
A procedure for updating the guideline is provided.	X	√	X
<b>Clarity of Presentation</b>			
The recommendations are specific and unambiguous.	√	√	√
The different options for management of the condition or health issue are clearly presented.	√	√	√
Key recommendations are easily identifiable.	√	√	√
<b>Applicability</b>			
The guideline provides advice and/or tools on how the recommendations can be put into practice.	X	√	X
The guideline describes facilitators and barriers to its application.	√	√	X
The potential resource implications of applying the recommendations have been considered.	√	√	√
The guideline presents monitoring and/ or auditing criteria.	X	X	√

AMSTAR Item	Loveday, 2014 <sup>5</sup>	NICE, 2012 <sup>6</sup>	PHAC, 2012 <sup>4</sup>
<b>Editorial Independence</b>			
The views of the funding body have not influenced the content of the guideline.	√	√	√
Competing interests of guideline development group members have been recorded and addressed.	√	√	√

# Appendix 4: Main Study Findings and Author's Conclusions

Table 4: Summary of Guideline Recommendations

Recommendations	Level of Evidence
Loveday, 2014 <sup>5</sup>	
<p><b><u>Hand Antisepsis Techniques</u></b></p> <p>Hands must be decontaminated:</p> <ul style="list-style-type: none"> <li>- Immediately before each episode of direct patient contact or care, including clean/aseptic procedures</li> <li>- Immediately after each episode of direct patient contact or care</li> <li>- Immediately after contact with body fluids, mucous membranes and non-intact skin</li> <li>- Immediately after contact with body fluids, mucous membranes and non-intact skin</li> <li>- Immediately after other activities or contact with objects and equipment in the immediate patient environment that may result in the hands becoming contaminated</li> <li>- Immediately after the removal of gloves</li> </ul>	<p><b><u>Class C</u></b> A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2++</p> <p><b>2+</b> well-conducted case-control or cohort studies with a low risk of confounding, bias or chance and a high probability that the relationship is casual <b>2++</b> high-quality systematic reviews of case-control or cohort studies</p>
<p><b><u>Hand Antisepsis Products</u></b></p> <p>Use an alcohol-based hand rub for decontamination of hands before and after direct patient contact and clinical care, except in the following situations when soap and water must be used:</p> <ul style="list-style-type: none"> <li>- When hands are visibly soiled or potentially contaminated with body fluids; and</li> <li>- When caring for patients with vomiting or diarrhoeal illness, regardless of whether or not gloves have been worn</li> </ul>	<p><b><u>Class A</u></b> At least one meta-analysis, systematic review or RCT rated as 1++, and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</p> <p><b>1+</b> well-conducted meta-analyses, systematic reviews of RCT, or RCT with a low risk of bias <b>1++</b> high-quality meta-analyses, systematic reviews of RCTs or RCT with a very low risk of bias</p>
<p><b><u>Hand Antisepsis Techniques and Hand-Drying</u></b></p> <p>Effective handwashing technique involves three stages: preparation, washing and rinsing, and drying.</p> <ul style="list-style-type: none"> <li>- Preparation: wet hands under tepid running water before applying the recommended amount of liquid soap or an antimicrobial preparation</li> <li>- Washing: the handwash solution must come into contact with all of the surfaces of the hand. The hands should be rubbed together vigorously for a minimum of 10–15 s, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers. Hands should be rinsed thoroughly</li> <li>- Drying: use good-quality paper towels to dry the hands thoroughly</li> </ul> <p>When decontaminating hands using an alcohol-based hand rub, hands should be free of dirt and organic material, and:</p>	<p><b><u>Class D/GPP</u></b> Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+</p> <p><b>3</b> non-analytic studies (for example, case reports, case series) <b>4</b> expert opinion, formal consensus</p> <p><b><u>Class D/GPP</u></b> Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+</p>

Recommendations	Level of Evidence
<ul style="list-style-type: none"> <li>- Hand rub solution must come into contact with all surfaces of the hand; and</li> <li>- Hands should be rubbed together vigorously, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers, until the solution has evaporated and the hands are dry</li> </ul>	
NICE, 2012 <sup>6</sup>	
<p><b><u>Hand Antisepsis Techniques</u></b></p> <p>Hands must be decontaminated in all of the following circumstances:</p> <ul style="list-style-type: none"> <li>- immediately before every episode of direct patient contact or care, including aseptic procedures</li> <li>- immediately after every episode of direct patient contact or care</li> <li>- immediately after any exposure to body fluids immediately after any other activity or contact with a patient's surroundings that could potentially result in hands becoming contaminated</li> <li>- immediately after removal of gloves</li> </ul> <p>Decontaminate hands preferably with a handrub (conforming to current British standards), except in the following circumstances, when liquid soap and water must be used:</p> <ul style="list-style-type: none"> <li>- when hands are visibly soiled or potentially contaminated with body fluids or</li> <li>- in clinical situations where there is potential for the spread of alcohol-resistant organisms (such as <i>Clostridium difficile</i> or other organisms that cause diarrhoeal illness).</li> </ul> <p><b><u>Hand Antisepsis Techniques and Hand-Drying</u></b></p> <p>An effective handwashing technique involves three stages: preparation, washing and rinsing, and drying. Preparation requires wetting hands under tepid running water before applying liquid soap or an antimicrobial preparation. The handwash solution must come into contact with all of the surfaces of the hand. The hands must be rubbed together vigorously for a minimum of 10–15 seconds, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers. Hands should be rinsed thoroughly before drying with good quality paper towels.</p> <p>When decontaminating hands using an alcohol handrub, hands should be free from dirt and organic material. The handrub solution must come into contact with all surfaces of the hand. The hands must be rubbed together vigorously, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers, until the solution has evaporated and the hands are dry.</p>	<p>Recommendation is based on the 2003 version of this guideline, which has since been withdrawn. The recommendation was reviewed in 2012 and no changes were made to the recommendation. Unable to determine the level of evidence the original recommendation was based on.</p> <p>Recommendation is based on the 2003 version of this guideline, which has since been withdrawn. The recommendation was reviewed in 2012 and no changes were made to the recommendation. Unable to determine the level of evidence the original recommendation was based on.</p> <p>Recommendation is based on the 2003 version of this guideline, which has since been withdrawn. Unable to determine the level of evidence the original recommendation was based upon.</p> <p>Recommendation is based on the 2003 version of this guideline, which has since been withdrawn. Unable to determine the level of evidence the original recommendation was based upon.</p>



Recommendations	Level of Evidence
PHAC, 2012 <sup>4</sup>	
<p><b><u>Hand Antisepsis Techniques and Products</u></b></p> <p>Hand hygiene using soap and water, instead of alcohol-based hand rubs, should be performed as follows:</p> <ul style="list-style-type: none"> <li>- To removed visible soil and/or organic material</li> <li>- When a buildup of alcohol-based hand rub product feels uncomfortable on the hands after multiple applications (Note: alcohol-based hand rub remains effective in this situation)</li> <li>- At the point-of-care after caring for patient with norovirus or <i>C. difficile</i> infection. If a designated handwashing sink is not available at the point-of-care, alcohol-based hand rub should be used and hands should be washed with soap and water as soon as a suitable handwash sink is available. (Note: patients with norovirus or <i>C. difficile</i> infection are on contact precautions. This includes wearing gloves for the care of the patients and/or contact with patient environment. Hand hygiene with soap and water should be performed following the removal of gloves at the point-of-care).</li> <li>- During outbreaks or in settings with high transmission of norovirus or <i>C. difficile</i> infection</li> <li>- With suspected or documented exposure to <i>B. anthracis</i>-contaminated items</li> <li>- Immediately after using toilet facilities</li> </ul> <p>Hand hygiene should be performed with alcohol-based hand rub preferable at the point-of-care in all healthcare settings.</p> <p>Alcohol-based hand rubs with an alcohol (i.e., ethanol, isopropanol or <i>n</i>-isopropanol) concentration above 60% and up to 90% should be used for clinical care</p> <ul style="list-style-type: none"> <li>- Alcohol concentrations above 80% may be necessary for gels</li> <li>- Alcohol concentrations with a minimum of 70% should be considered during outbreaks or in settings with a high transmission of norovirus</li> <li>- Hand rubs that contain either no alcohol or alcohol in concentrations lower than 60% for hand hygiene should not be used</li> </ul>	<p><u>Grade BII</u> Direct evidence from multiple moderate design studies of high quality with consistency of results <u>or</u> extrapolation from multiple strong design studies of high quality, with consistency of results</p> <p><u>Manufacturer's recommendation</u></p> <p><u>Grade AII</u> Direct evidence from multiple strong design studies of medium quality with consistency of results <u>or</u> at least one strong design study with support from multiple moderate design studies of high quality, with consistency of results <u>or</u> at least one strong design study of medium quality with support from extrapolation from multiple strong design studies of high quality, with consistency of results</p> <p><u>Grade BII</u></p> <p><u>Grade BII</u></p> <p><u>Grade AI</u> Direct evidence from meta-analysis or multiple strong design studies high quality, with consistency of results</p> <p><u>Grade AII</u></p> <p><u>Grade BII</u></p> <p><u>Grade BII</u></p> <p><u>Grade AII</u></p>

Recommendations	Level of Evidence
<ul style="list-style-type: none"> <li>- Hand hygiene products purchased for use in Canadian healthcare settings should be approved for professional use and have either a Health Canada Natural Product Number or a Drug Identification Number</li> <li>- Hand hygiene products that are compatible with each other and do not adversely affect glove integrity should be used</li> </ul>	<u>Grade AII</u>
Hand hygiene, preferably with an alcohol-based handrub, should be performed as follows:	
<ul style="list-style-type: none"> <li>- Before and after contact with a patient, even if gloves are worn</li> </ul>	<u>Grade AI</u>
<ul style="list-style-type: none"> <li>- After contact with the patient environment (e.g., inanimate objects in the patient's vicinity, including medical equipment and environmental surfaces, such as bed tables or door handles) or after contact with items known or considered likely to be contaminated (e.g., bedpans, urinals, wound dressings), even if gloves are worn</li> </ul>	<u>Grade AI</u>
<ul style="list-style-type: none"> <li>- Before moving to a clean-body site from a contaminated-body site during the care of the same patient</li> </ul>	<u>Grade BII</u>
<ul style="list-style-type: none"> <li>- After known or potential contact with blood, body fluids, respiratory and/or other secretions and excretions, exudates from wounds, mucous membranes or non-intact skin, even if gloves are worn and regardless of whether the source is the patient or healthcare worker</li> </ul>	<u>Grade AI</u>
<ul style="list-style-type: none"> <li>- Immediately after removing gloves to prevent contaminating other patients, patient-care items or environmental surfaces</li> </ul>	<u>Grade AI</u>
Hand hygiene with alcohol-based hand rub should be performed before any procedure requiring aseptic technique, including invasive procedures (e.g., placing central intravascular catheters, placing catheters or injecting into the spinal canal or subdural spaces)	<u>Grade AII</u>
<ul style="list-style-type: none"> <li>- Handwashing with antimicrobial soap and water should be performed before procedure requiring aseptic technique when alcohol-based hand rub is not accessible</li> </ul>	<u>Grade AII</u>
Hand hygiene, preferably with alcohol-based hand rubs, should be performed before feeding patients or preparing food or oral medications	<u>Grade AII</u>

Recommendations	Level of Evidence
<p><b><u>Hand Wipes</u></b></p> <p>Hand wipes impregnated with plain soap, antimicrobials, or alcohol should not be used as an alternative to alcohol-based hand rub or antimicrobial soap for hand antisepsis</p> <ul style="list-style-type: none"> <li>- Hand wipes may be used as an alternative to soap and water when hands are visibly soiled and a designated handwashing sink is not immediately available (e.g., prehospital care), or when the handwashing sink is unsuitable (e.g., contaminated sink, no running water, no soap). In this instance, alcohol-based hand rub should be used after the use of hand wipes—and hands should be washed with soap and water once a suitable handwashing sink is available.</li> <li>- Hand wipes may be used as an alternative to soap and water when hands are not visibly soiled and a designated handwashing sink is not immediately available (e.g., prehospital care), or when the handwashing sink is unsuitable (e.g., contaminated sink, no running water, no soap).</li> </ul>	<p><u>Grade All</u></p>
<p><b><u>Hand Antisepsis Techniques</u></b></p> <p>Effective hand hygiene should be performed by ensuring the following appropriate technique for the use of alcohol-based hand rubs</p> <ul style="list-style-type: none"> <li>- Long sleeves should be rolled up and wrist watch pushed up.</li> <li>- Product should not be applied to wet hands, as they will dilute the alcohol.</li> <li>- Manufacturer's instructions should be followed. iv. Enough product should be applied to wet the fingers, finger tips, between fingers, palms, backs of hands and thumbs, base of thumb, and if a ring is worn, on and under the ring.</li> <li>- All hand surfaces should be rubbed until product has dried.</li> <li>- Alcohol-based hand rub should be allowed to dry prior to contact with an oxygen-rich environment, prior to putting gloves on, and prior to proceeding with patient care.</li> </ul>	<p><u>Grade All</u></p>
<p>Effective hand hygiene should be performed by ensuring the following appropriate handwashing technique</p> <ul style="list-style-type: none"> <li>- Long sleeves should be rolled up and wrist watch pushed up.</li> <li>- Running water of a comfortable temperature should be used to wet hands.</li> <li>- Enough soap should be used to lather all surfaces of the hands, including fingers, finger tips, between fingers, palms, backs of hands and thumbs, base of</li> </ul>	<p><u>Grade All</u></p>

Recommendations	Level of Evidence
<p>thumb, and if a ring is worn, on and under the ring.</p> <ul style="list-style-type: none"> <li>- The palms and backs of each hand should be rubbed vigorously, interlocking and interfacing fingers to ensure that fingers and thumbs are rubbed to remove visible soil and/or organic material (this task should take 15 to 30 seconds).</li> <li>- Hands should be rinsed thoroughly in a downward position under running water.</li> <li>- Hands should be dried thoroughly by patting with a single-use towel; electric hand dryers should not be used in clinical areas.</li> <li>- Manual faucets should be turned off with paper towels, ensuring that hands are not recontaminated in the process.</li> <li>- Skin products, such as hand lotion, should be applied regularly to maintain healthy skin.</li> <li>- The complete handwashing procedure (going to a sink, wetting hands, applying soap, lathering, rinsing and drying) should take 40 to 80 seconds.</li> </ul>	

<sup>a</sup>verbatim statements from the full-text document

## Appendix 5: Additional References of Potential Interest

### Previous CADTH Report

Techniques and products for surgical hand antisepsis: a review of guidelines [Internet]. Ottawa: CADTH; 2014 Jul [cited 2017 Mar 9]. (CADTH Rapid Response Reports). Available from: <https://www.cadth.ca/sites/default/files/pdf/htis/nov-2014/RC0566%20Surgical%20Hand%20Antisepsis%20Final.pdf>

### Clinical Practice Guidelines – Unclear Methodology

Mehta Y, Gupta A, Todi S, Myatra S, Samaddar DP, Patil V, et al. Guidelines for prevention of hospital acquired infections. Indian J Crit Care Med [Internet]. 2014 Mar [cited 2017 Mar 9];18(3):149-63. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3963198>

Best practice for hand hygiene: in all healthcare settings and programs [Internet]. Victoria: British Columbia Ministry of Health; 2012 Jul [cited 2017 Mar 9]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2012/best-practice-guidelines-handhygiene.pdf>

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for hand hygiene in all health care settings [Internet]. 4th ed. Toronto: Queen's Printer for Ontario; 2014 Apr [cited 2017 Mar 9]. Available from: <http://www.publichealthontario.ca/en/eRepository/2010-12%20BP%20Hand%20Hygiene.pdf>

### Evidence-Based Guideline – Outdated Material

Centers for Disease Control and Prevention. Guideline for hand hygiene in healthcare settings [Internet]. Atlanta: U.S. Department of Health & Human Services; 2002 [cited 2017 Mar 9]. Available from: <https://www.cdc.gov/handhygiene/providers/guideline.html>